

Dive into Lake Massapoag - Goal: Watershed-Based Plan 2025-2050



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& Josh Philibert, Town of Sharon Conservation Administrator
October 31, 2023

Lakes have a lifecycle... ... and need help



- 1984 study predicted Lake Massapoag eutrophic by 2000 (too many nutrients, too much growth & decay)
- Many recommendations – town took action, we gained nearly 40 years of lake health

New Challenges: development, rain/runoff excess nutrients

- Lake closed 2+ weeks July 2021 due to cyanobacteria bloom
- Community Center Beach closed 8 times 2022 due to E. coli
- Cyanobacteria blooms seen late Aug-Oct 2021, 2022 & 2023

Why do lakes become eutrophic?

Lake Massapoag is at a crossroads

Water flows downhill...

...and washes off the land



Eutrophication over lifecycle is a natural process
Human activities accelerate eutrophication
Phosphorus fuels algae, weeds, eutrophication

The boundary of a watershed is like the sides of a bathtub

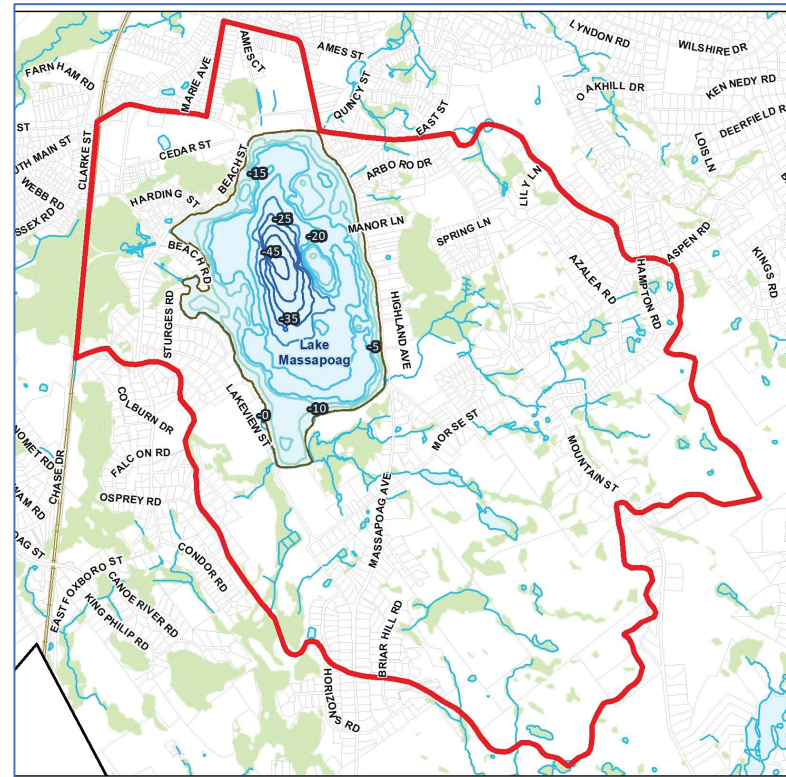
Credit: Charles River Watershed Association

Lake Massapoag Watershed

- 900 homes in Watershed
- 1984 study predicted Lake Massapoag eutrophic by 2000: too many nutrients, too much algae/plant growth & decay
- Actions taken gained nearly 40 years of lake health
- Threats: fertilizer P, septic, etc. + climate: rain, runoff, heat =
- Cyanobacteria, E. coli, weeds

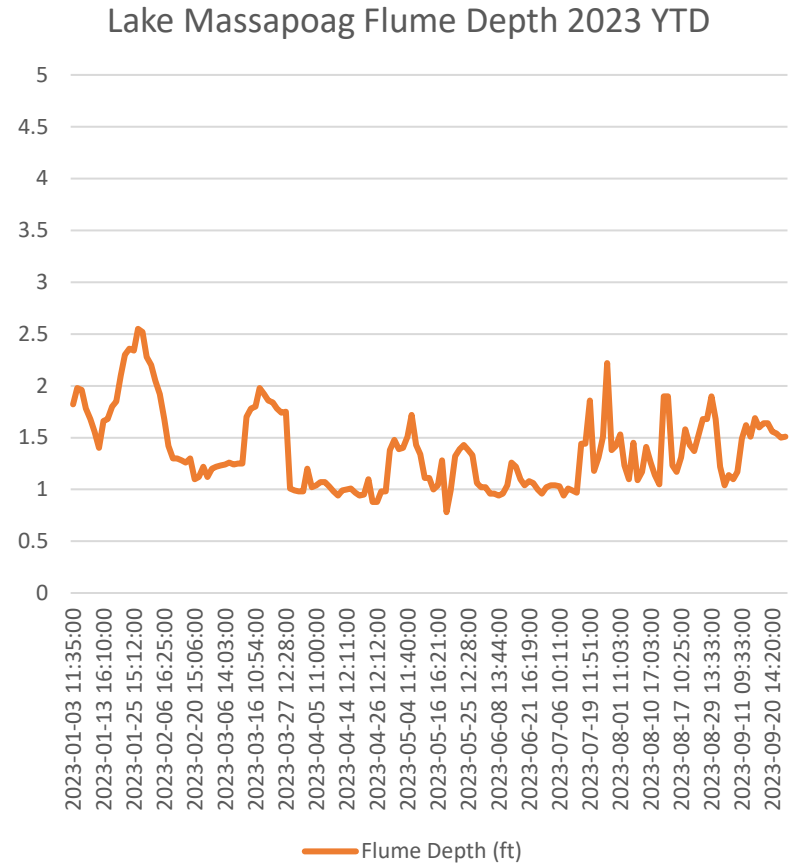
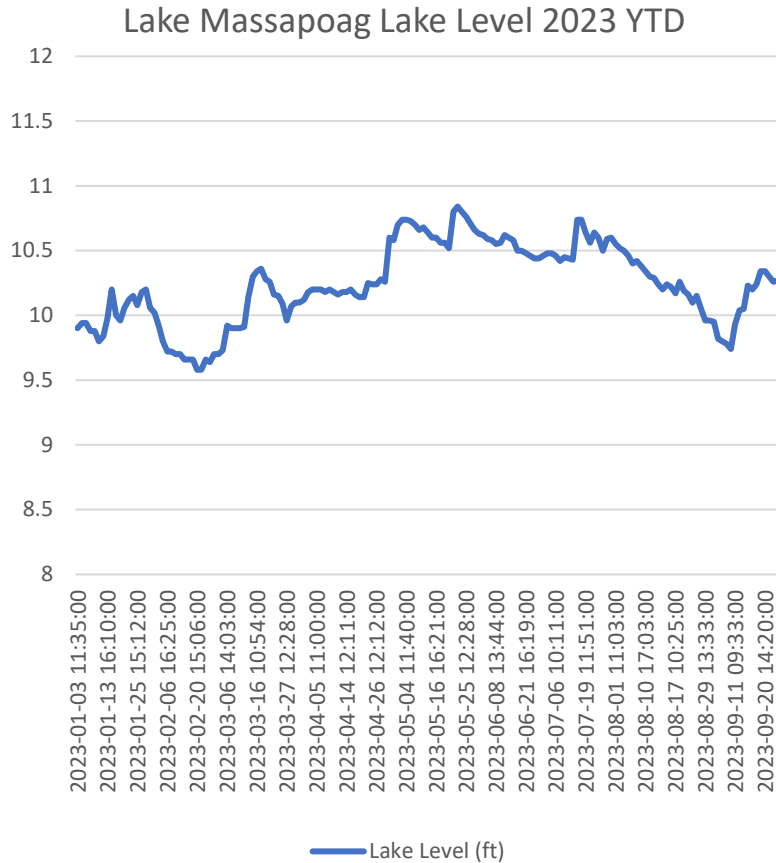
Sources:

IEP Study, 1984 <https://bit.ly/3EGc6r6>



Source: Town of Sharon, MA Web GIS Maps
<https://www.mainstreetmaps.com/ma/sharon/public.asp>

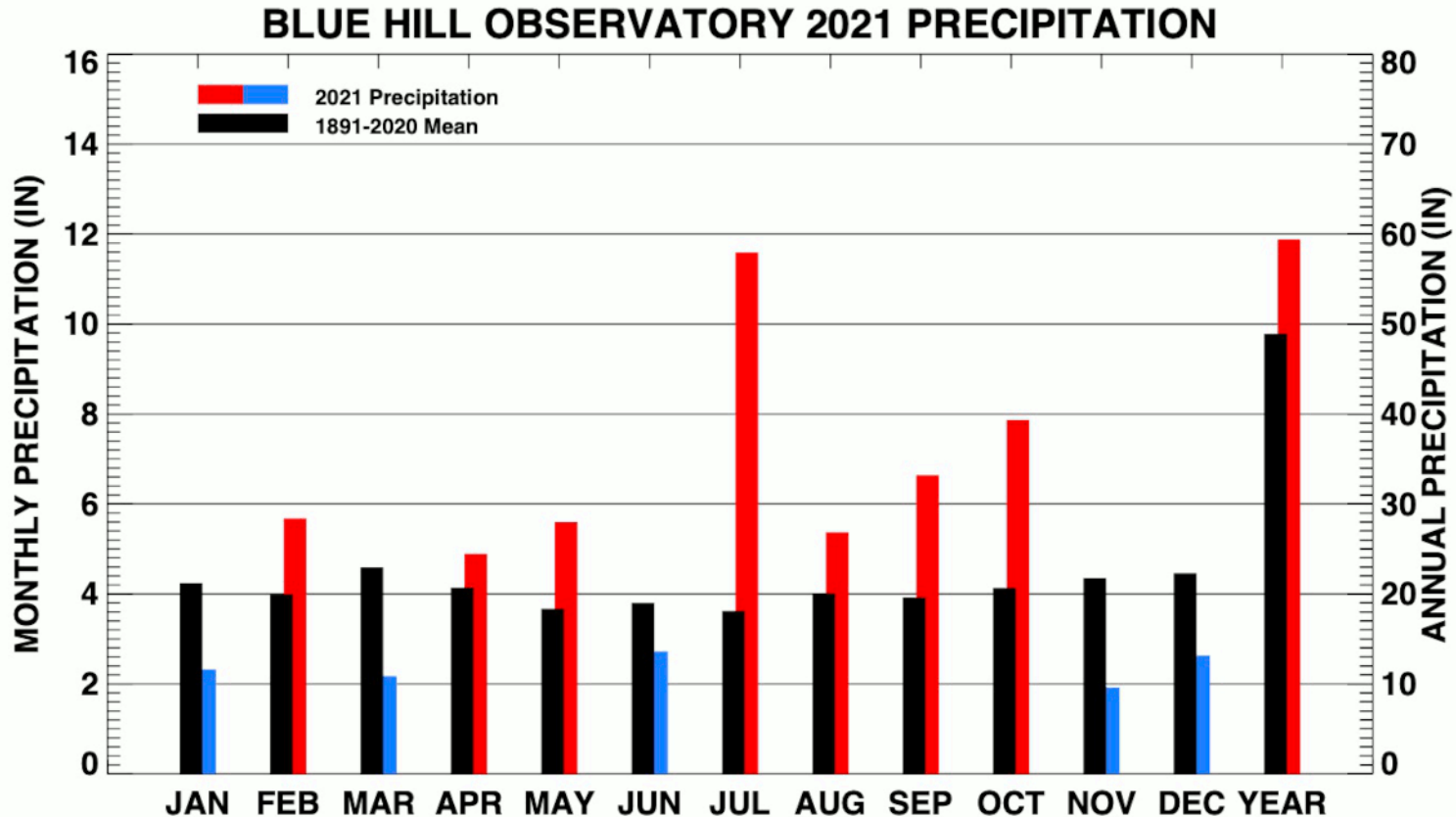
Lake flows to Neponset Watershed



Conservation manages lake level: guidelines for max and min lake level and flume depth – for lake and downstream health

Climate change → extreme storms

3 Tropical Storms (Elsa, Henri & Ida) July, Aug, Sept 2021



Heavy rainfall in July 2021 led to a lakewide cyanobacteria bloom which required the Board of Health to close the lake for over 2 weeks to all uses until two successive weekly DPH tests came back below the level of concern.

Heavy Rainfall: phosphorus runoff fuels cyanobacteria, sand & muck promote weeds



**Memorial Beach Sept 3, day after Ida: 3rd tropical storm 2021
There is also runoff from yards, streets, streams and storm drains.**

Community Center Beach – many closings

Board of Health tests beaches weekly, LMAC inflows monthly

Town Public Swimming Area Beaches							Other Swimming Areas (non-public beaches)							
Date	Memorial Beach Swim Docks	Geo-mean	Memorial Beach Center	Geo-mean	Community Center Beach!	Geo-mean	Camp Wonderland	Geo-mean	Camp Everwood/Gannett	Geo-mean	Camp Everwood	Geo-mean	Massapoag Yacht Club	Geo-mean
5.30.23	<5		5		20								<5	
6.5.23	<5		124		15								10	
6.12.23	8		16		116				**980		**184		<5	
6.16.23									5		5			
6.19.23	<5		56		188		48		20		5		5	
6.26.23	<5	4	<5	18	708	87	<5		<5		25		<5	
7.6.23	32	6	28	25	40	100	5		5		5		10	
7.10.23	10	7	24	18	24	110	20		8		100		5	
7.17.23	16	9	72	24	308	134	20		200		500		28	
7.18.23									120		68			
7.24.23	16	12	148	29	52	104	5		24		5		<5	
7.31.23	5	13	40	49	100	69	No test		10		24		5	
8.3.23							<5							
8.7.23	<5	8	16	44	800	125	10		35		5		5	
8.14.23	5	7	<5	29	40	139	<5		32		12		<5	
8.21.23	32	8	15	21	15	76	No test		32		28		40	
8.28.23	5	7	10	12	<5	43	No test		No test		No test		15	
9.5.23	20	9	10	9	760	64	No test		No test		No test		No test	
9.11.23	32	14	184	15	172	47	No test		No test		No test		No test	
9.18.23	5	14	24	23	15	39	No test		No test		No test		No test	
9.25.23	5	10	5	19	25	43	No test		No test		No test		No test	



- *Community Center Beach has most E. coli problems: 41% 2021, 44% 2022, 22% 2023 (closed)*
- *Of lake inflows, Sucker Brook has the most high E. coli: 75% 2021, 75% 2022, 50% 2023.*
- *2022: drought, heat; 2023: higher rain, heat*

No Swimming:
Closed due to *E. coli*
>235 cfu/100 ml

Lake Inflows - many high phosphorus

LMAC tests inflows & tributaries monthly

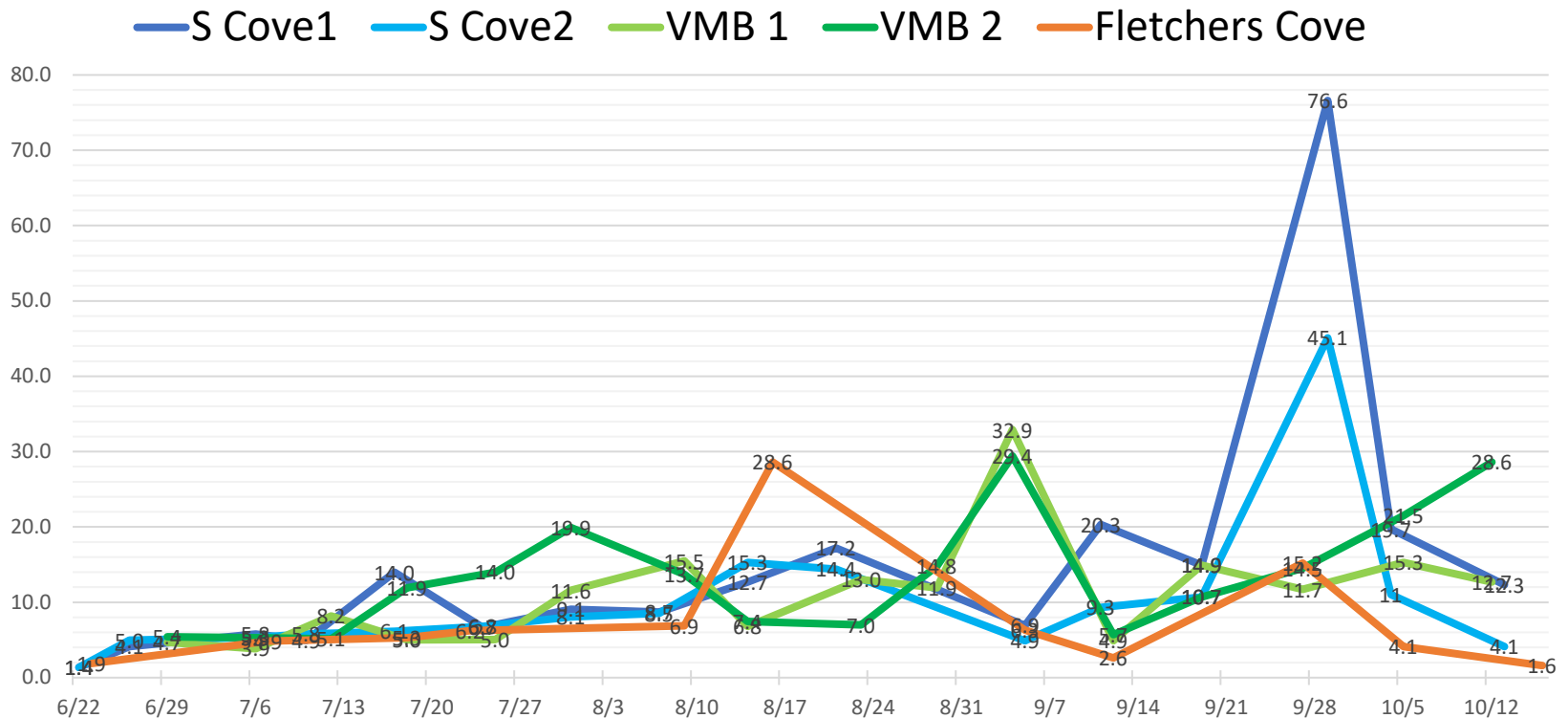


- *Of 11 inflows in 2022, Wetland/SHS had 100% high P levels, 140 E. Foxboro 83%, Lagoon 43%.*
- *Of 14 inflows in 2023, Wetland/SHS had 80% high P levels, 123 Beach 75%, opp 3 Capen Hill 67%, 240 Massapoag 67%.*
- *2022: drought, heat; 2023: higher rain, heat*

Phosphorus feeds cyanobacteria, exacerbated by rain, runoff & heat

2023 Lake Massapoag Phycocyanin Levels Weekly Monitoring – Grab Samples

Phycocyanin (ug/L)



Phycocyanin (PC) is a photosynthetic protein found only in cyanobacteria, so the levels correlate with the level of cyanobacteria.

WHO alert levels ([Brient et al. 2008](#))

Level 1: PC > 30 µg/L (equivalent to 20,000 cells/ml) Requires weekly water monitoring to assess the risk of bloom.

Level 2: PC > 90 µg/L (equivalent to 100,000 cells/ml). Restrict water use due to the high potential risk of cyanotoxin.

Source: Debbie Tatro, LMAC

Lake Massapoag Dashboard: June - Sept YTD 2023

Lake Level @ 10.3' (Sept 22)

Conditions: [High Rain](#), [High Heat](#)

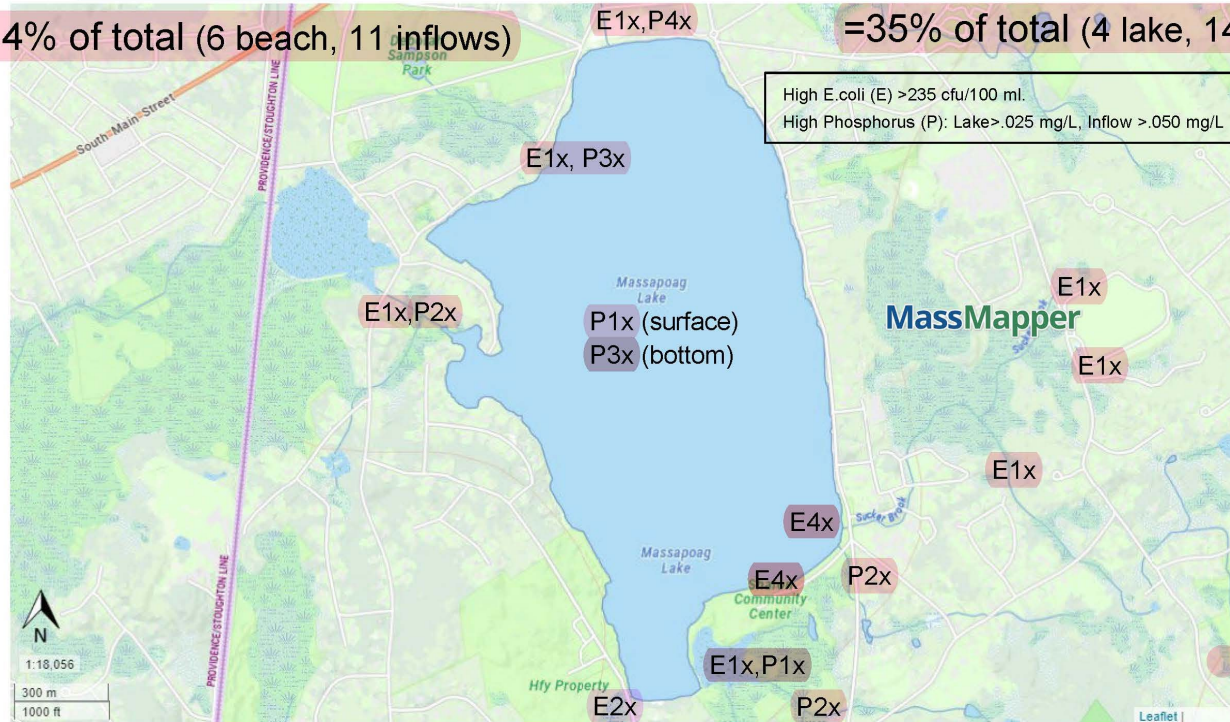
Flume Depth @ 1.48' (Sept 22)

High E coli (E): 17 samples

High Phosphorus (P): 18 samples

=14% of total (6 beach, 11 inflows)

=35% of total (4 lake, 14 inflows)



E = High E. coli at beaches: Community Center Beach 4x 6/26, 7/17, 8/7, 9/5; Everwood/Gannett 6/12, Everwood 7/17.

E = High E. coli at inflows: Sucker Brook 4x 6/27, 7/17, 8/31, 9/25; Opp 123 Beach, Longmeadow, Landfill S, Landfill N 6/27; Lagoon, 140 E. Foxboro, Wetland/SHS 7/17.

P = High phosphorus in lake: Deep Hole (surface) 5/17; Deep Hole (bottom) 5/17, 7/17, 9/18.

P = High phosphorus inflows: Wetland/SHS 4x 6/20, 6/27, 8/31, 9/26; Opp 123 Beach 3x 6/27, 8/31, 9/26; 140 E. Foxboro 2x 6/27, 9/26; opp 3 Capen Hill 2x 8/31, 9/26; 240 Massapoag 2x 6/27, 9/26; Lagoon 1x 6/13.

Two years later... where's the beach?



where's the runoff?
what's our future?

**Memorial Beach August 18, 2023 after 1.5 inches of rain, almost 5 in/hour
There is also runoff from yards, streams, streets, and storm drains.**

Education Campaign

Love Our Lake!
Less Fertilizer,
No Phosphorus

Best Practices:

- Soil Testing – Send sample to UMass Amherst \$20
<https://ag.umass.edu/services/soil-plant-nutrient-testing-laboratory/lab-services>
- Minimize fertilizer & pesticides – apply only as needed
- Cancel summer lawn service applications
- Build rain gardens, consider lawn alternatives
- Yearly septic pumping, upgrade as needed
- Town low-cost loan program to help upgrade septic systems

Watershed-Based Plan for Resilient Lake Massapoag 2025-2050

- Ongoing lake & inflow testing, cyanobacteria monitoring
- Add shoreline seepage, wet weather shoreline & storm drain testing
- Nutrient/phosphorus budget: inflows, runoff, sediment contributions
- Catchment delineation & loading analysis, storm drain hydro modeling
- Best Management Practices (BMP) retrofit survey, prioritize projects
- Feasibility & cost-benefit analysis of Phosphorus mitigation strategies:
 - Watershed BMP sites, green infrastructure enhancements, etc.
 - Hot spots (Lagoon/S. Cove, Sucker Brook/Community Center Beach)
 - In-Lake treatment such as high dose alum, explore new technologies

Education and Outreach: Love Our Lake campaign, stakeholders, youth

Partners: NepRWA, TRC, Sustainable Sharon Coalition, Everwood Day Camp, Camp Wonderland, Sharon High School, MYC. Join us!

Funders: MVP Action & DEP 604b Grants for Watershed-Based Plan

Do we want this?



Or this?



Lake Massapoag Advisory Committee (LMAC)

Learn, Help, Act: see www.lakemassapoag.net

LMAC webpage: www.townofsharon.net

Laura Henze Russell, Chair; Debbie Tatro, V. Chair lakecom@townofsharon.org

Josh Philibert, Sharon Conservation Administrator

Watershed-Based Plan for Resilient Lake Massapoag 2025-2050

- EEA Municipal Vulnerability Preparedness (MVP) Action Grant FY24
- DEP 604b Watershed Planning Grant FY24-FY25
- Town of Sharon, CPC, Partners, Stakeholders

Love Our Lake Campaign

Volunteers welcome. Thank you!